

clay, that is of the mud, &c., which then issued in streams from beneath the glaciers, and contains the pebbles derived from distant localities which had drifted in icebergs and coast-ice, and been dropped into it, the land being raised to a considerable extent when, upon the return of a more genial climate, it was relieved of its load of ice and snow.

Prof. N. S. Shaler, of Harvard College, U.S.A., in 1874 (*Mem. Boston Soc. Nat. Hist.* vol. ii.), considering that by the hypothesis of Adhemar the conditions which would have resulted were not fulfilled during the last Glacial period, concluded that we may more reasonably look to the weight of ice then accumulated on the continents for the depression of the land areas it occupied.

In a paper on the "Cause of the Glacial Period," read before Section C at the meeting of the British Association at Bristol, 1875 (*Report*, p. 79; also *Geol. Mag.*, Decade II., vol. ii.) I adduced evidence tending to prove that such a subsidence of the Isthmus of Panama has taken place as would allow a diversion of the equatorial waters of the Atlantic into the Pacific; as a consequence of which similar effects to those which occurred during the Glacial period might have been produced. The formation of the Canal ought to afford to competent observers absolute proof whether such has been the case or not. In the course of the essay I ascribed not only the subsidence during the Glacial period, but also that now rapidly progressing in Greenland, to the weight of the greatly increased accumulation of snow; and that the rise of the land in Norway is dependent on the removal of pressure by the melting or diminution of the glaciers. It does not appear unlikely that to a great extent the rising of the Andes may be due to the dissolution of the snow which once covered these mountains in a greatly increased degree, it may have been contemporaneously with the Glacial period in Europe and North America; and in part to the transfer of pressure, by the materials derived from its flanks and brought down by the Amazon and its tributaries forming at its delta the "measures" in this great coal-field of South America now in process of formation.

Mr. J. Starkie Gardner, at a much later period (*Geol. Mag.*, June, 1881) stated that great accumulations of ice in the Glacial period seem to have been accompanied by subsidence, and even Greenland at the present day may be sinking under its ice-cap. In the same year the Rev. O. Fisher, in "Physics of the Earth's Crust" (p. 223), accounted for the raised shell beds found in Scandinavia at an altitude of 700 feet, by the country having been formerly depressed owing to its being loaded with heavy ice fields, and that its gradual subsequent rise may have been caused by the ice having melted off. He remarks that similar movements have occurred and are now going on in Greenland; and that the subsidence of 6 or 8 feet in a century may possibly be accounted for by the snow-fall being at present greater than is carried off by the glaciers and evaporation.

During the present year Mr. W. F. Stanley (*NATURE*, vol. xxvii. p. 523) held that the cause of the coast of Greenland sinking is the weight of the present accumulation of ice upon that continent. Quite recently Mr. Searles V. Wood (*Geol. Mag.*, July, 1883, footnote) thinks that the overwhelming of reindeer pastures by the ice during the centuries of Danish occupation, and the indications of subsidence afforded by the position of ancient dwellings, may show that the ice is now augmenting, and the land sinking under its weight.

But the great question is not to whom belongs the priority of attributing the depression of the land during the Glacial period, and at present in Greenland, to the weight of accumulated snow, and the relevation to its removal; even this explanation of the phenomena under consideration, important though it may be, is but an item in the still greater one, namely, whether the depression which has taken place and is still in progress at the mouths of great rivers, in their deltas, in the estuaries and bays into which, emptying themselves, they carry mud, sand, pebbles, and other debris, is caused by the weight of these accumulated deposits pressing down the crust of the earth beneath them, thus permitting further accumulation to any extent; and also whether the subsidence, which by every one is conceded to have occurred during the deposition of all stratified rocks, from the earliest of which we can read the record in the "great stone book" to those now in progress, is due to the same cause—the weight of the materials of which they have been formed.

The converse has also to be inquired into, whether the elevation of the land and the formation of hills and mountains is the result of the abrasion of the land and the transfer of the disintegrated materials to a distance by rain and rivers; thus relieving

by so much the locality from which they have been removed of the weight pressing on the crust of the earth. The highest hills in a district are those from which the greatest amount has been removed by denudation, their summits not unfrequently consisting of the lowest rocks in the geological series of the neighbourhood.

Birkenhead, September 22

CHARLES RICKETTS

I QUITE agree with Mr. Mackie in believing that "the connection between sedimentation and subsidence on the one hand, and between denudation and elevation on the other," are "simply concomitant effects of the same cause;" that, in fact, depressions in the earth's crust are the cause of sedimentary deposits, and not the deposits the cause of the depressions, and, further, that the elevations and depressions are caused by lateral pressure developed by the shrinking of the earth's crust; but is it necessary that certain parts of a depressed area should be "strengthened by volcanic outbursts, &c."? I do not think so.

If a magazine or book with a paper cover be held close, and pressed from back to front, the mass of the leaves is thrown into anticlinal and synclinal curves though the book is at no point stronger than at any other; the pressure is brought to bear upon the book, and as it cannot "telescope," it is necessarily bent upwards and downwards. Is this not something like what happens to the rock?

Take, for example, the Old Red Sandstone between the base of the Grampians and the Carboniferous rocks of Fife. This is a plain partly composed of sandstones, partly of sandstone with interbedded volcanic rocks, and partly of solid masses of volcanic ejecta. The plain has been bent into two anticlinal and two synclinal curves.

In such a varied area, if anywhere, one would expect to find evidence of the influence of the relative strength of the rocks in modifying their curvature.

The syncline nearest to the Grampians is mainly composed of sandstone and conglomerates; as these rocks bend up towards the anticlinal axis to the south, the Sidlaw Hills (composed of hard sandstones and interbedded porphyrite, &c.) present a very striking example of strengthening of the beds; still they are neither on the anticlinal nor the synclinal axis, for though near to and towering high above the former, they lie on the slope of the beds dipping towards the north. The rocks of the second syncline are sandstones with intrusive and interbedded lavas, the volcanic rocks greatly increasing in proportion to the sedimentary towards the synclinal axis near the estuary of the Tay, towards which the rocks are gently bent up, while across the estuary, which occupies the position of the denuded arch of the anticline, the rocks are almost entirely sheets of lava, with volcanic breccias, &c.

Thus we have a synclinal and anticlinal curve, both of sandstone, while the hard and thickly-bedded volcanic rocks form part of the slope between them, and again we have a syncline partly composed of interbedded lavas and sandstones, while the almost entirely volcanic rocks are bent up into an anticline.

It would therefore seem that the quality and thickness of the rock masses have very little influence upon the form of the curves into which they are bent.

JAS. DURHAM

Newport, Fife

### Photography and Still Life

I HAVE been assured, by a gentleman to whose opinion all dabblers in science photography must bow, that the following method of photographing objects of still life was unknown to him, and that its publication might prove useful to others.

Having some years ago to photograph a series of implements to illustrate a paper on the Borness Cave, I was met at the outset by the difficulty of avoiding cast shadows and such accessories as were needful for posing the objects to be copied. It occurred to me that a pane of glass, a white cloth, and some beeswax would meet the difficulty; as objects fixed to the glass by beeswax with a white cloth behind them would "come out" on a white ground free from the shadows and accessories I wished to avoid. Having been recently asked to photograph some important bones, teeth, and flint implements, necessity, "the mother of invention," has much improved on the original rough process, and I can confidently recommend the following cheap apparatus as extremely efficient, viz., a square pane of plate glass with a hole drilled in the centre (for fastening such

objects as may be too heavy for the beeswax). The pane to slide between two grooves into any convenient movable stand. The advantage of this form and arrangement is obvious, as after the object or objects are fixed to the glass they can be inverted or placed sideways, as may best suit the light, without moving the camera. Moreover, the stand can be tilted or set obliquely at the operator's pleasure, the object being thus adjusted to the camera instead of the camera to the object. The backgrounds can of course be changed at will to any shade between black and white—a most important power, as a background that will set off one object will often be unsuitable to another.

Torquay, September 15

ARTHUR R. HUNT

#### Animal Intelligence

AT the north side of Dublin there is at Clontarf a sea inlet where the water at certain times of the tide is very shallow. A little stream flows under the road into the sea at this place. The bridge beneath which it passes has pretty high parapets. A huge dog, a frequent companion during my student days, used to mount one of these parapets, employing it as a lookout when he happened for the moment to lose sight of me. Mrs. Comerford, widow of a distinguished barrister, was my landlady. This dog, aided by an accomplice named Bran, slew Mrs. Comerford's red cat, a great favourite, and buried him, all but the point of his tail, in the garden. The accomplices demeaned themselves in the most innocent manner, but betrayed considerable confusion when their delinquency was detected. It did not seem to occur to their canine minds that the mere tip of the poor cat's tail, when the body itself was out of sight, could possibly incriminate them. But to return to Clontarf. It was the practice among the lads about, when the depth of water suited, to wade out and catch little flatfish. These abound in great numbers, and lie commonly on the seabed. The waders went in barelegged, and when they happened to tread upon a fish, kept the foot in position until they could stoop down and secure their prey. One of the fisherboys was one day attended by his dog, and when the intelligent creature saw the work in which his master was engaged, proceeded to help him by plunging about, and whenever he felt a fish, kept his paw upon it until his master should come up and place it in his creel. This curious method of catching flatfish is not confined to Clontarf. I was walking one day along Con's Water, called after the old chieftan of the name, Con or Constantine O'Neil, when I observed a barefooted lad wading in the shallow water, for the tide was out, and from time to time casting something on the bank. He was catching flatfish with his feet. I did not detect his occupation, in which he seemed pretty successful, until I went close up in order to see what he was about.

Belfast, September 22

HENRY MACCORMAC

#### Meteor

It may interest some of your readers to know that a meteor was seen here this evening during a thunderstorm, and immediately after a flash of lightning. It appeared about the size of an ordinary cricket ball, and was of a brilliant yellow colour, and moved very slowly in an upward northerly direction from about east-south-east. As it moved along, it gradually decreased to the size of an ordinary star, and was then lost to my view. The storm began about 7 o'clock, and lasted about half an hour, during which time the lightning was very vivid. A very thick fog (that arose suddenly) preceded the storm, but disappeared before its commencement. The weather during the day had been close, with heavy showers at intervals. C. FORTESCUE

11, Oxford Road, Banbury, September 20

#### A Remarkable Rainbow

ON Monday, September 24, I saw at Chertsey, in Surrey, a remarkable rainbow. Beyond the blue of the inner bow the colours repeated themselves three times, so that there appeared four contiguous spectra; the three extraordinary ones being narrower and less bright than the ordinary. The outer bow appeared as usual. I am not aware that this phenomenon has been noticed before, and being quite unable to account for its appearance would be greatly obliged to any one who would enlighten me.

Firfield, Weybridge Heath, September 25

L. C.

#### Professor Cayley

WITH reference to Dr. Salmon's account of Dr. Cayley's undergraduate career it may be worth while to call the attention

of some of the readers of NATURE to a contemporary description in C. A. Bristed's "Five Years in an English University," vol. i. pp. 130-132 (1852). In this volume are also to be found many notices of other Senior Wranglers and Senior Classics of about the above date.

R. T.

#### THE NORDENSKJÖLD GREENLAND EXPEDITION

THE following is an abstract of two communications received from Dr. A. G. Nathorst, dated Upernivik, in Greenland, July 22 and August 2, in which the eminent Swedish naturalist gives an account of the work of the Nordenskjöld expedition up to the latter date:—

Having left Reikiavik on June 10, we sighted the coast of Greenland in lat. 65° 50' on the 12th, but were unable, on account of the pack-ice, to reach the shore. During the following day we steamed along the ice, dredging and making hydrographical measurements with great success, and on the 14th we came very close to the shore in lat. 62° 40', but, as it was impossible to land even here, we made for Julianshaab, *vid* Cape Farewell. From there Nordenskjöld, Herr Kolthoff, and myself made an excursion to Nunasernansak, in the Kongerdluarsuk Fjord, the only spot on the earth where the remarkable mineral "endialyt" is found, and from which the metal known as zirconium is produced. Of this, as well as of other minerals found here, we made an excellent harvest.

Having called at Godhavn, we arrived, on June 29, at Ujaragsugsuk, where Herr Hamberg and I landed in order to examine the fossil plant-bearing strata here, while the vessel proceeded to the Auleitsvik Fjord, whence the ice journey was to commence. On the way north the *Sophia* called at Egedesminde, and on July 1 anchored at Tessiursarsoak, where a splendid harbour was discovered, which was afterwards charted by Sergeant Kjellman under the name of "Sophia Harbour." July 2 and 3 were spent in bringing the baggage for the ice journey up on the ice, and on July 4 Nordenskjöld started in the company of Dr. Berlin, in the finest weather, on his inland excursion.

On July 8 the ship was to have left the harbour to take us on board again, but it was not until four days after that she succeeded in getting out on account of ice. These days were occupied by Dr. Forsstrand and Herr Kolthoff in dredging and in making ornithological, entomological, and botanical collections, a labour which was attended with remarkable success. On the 14th the *Sophia* arrived at Godhavn, where the *Yantic* and *Proteus*, the two American vessels on the way to Smith's Sound for the relief of Lieut. Greely's expedition at Lady Franklin Bay, were lying. Here the well-known Esquimaux interpreter, Hans Hendrik—generally called Hans Christian—who has participated in Arctic expeditions ever since Kane's voyage, joined the vessel, and on the 7th Herr Hamberg and I were taken on board.

The results of our researches at Ujaragsugsuk are *exceedingly* good, and many new discoveries, both geological and palæontological, have been made. The finds made at Atonekerdluk, on the other side of the Waigat, were especially very remarkable and valuable, as a number of hitherto unknown strata bearing fossil plants were discovered, from which magnificent leaves of *Aralia*, *Magnolia*, *Lycasartia*, *Platanæ*, and others were extracted. An idea of the size of the collection made may be gathered from the fact that they fill five large barrels, five boxes, and a firkin, which will all be despatched by a sailing vessel to Copenhagen. On July 22 the *Sophia* left Upernivik for Cape York, where Hans Hendrik says that the iron blocks we desire to examine are really lying. On the way north we found little ice, most of it being "calved" from the glaciers; we encountered, however, much fog, and were often compelled to "lay to," but such time has always been spent in dredging and studying the sea.